

THE CLAIMS

What Is Claimed Is:

- 5 1. A wafer carrier enabling a wafer of different size and/or shape to be processed in a process tool configured for processing a wafer of a predetermined size and/or shape, wherein the wafer carrier has said predetermined size and/or shape and includes at least one recess therein having said different size and/or shape.
- 10 2. The wafer carrier of claim 1, wherein said different size and/or shape differs from said predetermined size and/or shape, in respective shapes.
3. The wafer carrier of claim 1, wherein said different size and/or shape differs from said predetermined size and/or shape, in respective sizes.
- 15 4. The wafer carrier of claim 1, having a wafer in a recess therein, in close-fit relationship to the recess.
5. The wafer carrier of claim 4, wherein each of the wafer carrier and said recess
- 20 therein has a cylindrical shape.
6. The wafer carrier of claim 5, wherein said wafer carrier has an outer diameter on the order of 150 mm, and the wafer and wafer recess have a diameter on the order of 100 mm.

7. The wafer carrier of claim 5, wherein said wafer carrier has an outer diameter on the order of 200 mm, and the wafer and the wafer recess have a diameter on the order of 100 mm.

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8. The wafer carrier of claim 5, wherein said wafer carrier has an outer diameter on the order of 200 mm, and the wafer and the wafer recess have a diameter on the order of 150 mm.

- 10 9. The wafer carrier of claim 5, wherein said wafer carrier has an outer diameter on the order of 150 mm, and the wafer and the wafer recess have a diameter on the order of 125 mm.

10. The wafer carrier of claim 1, having a generally planar body.

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11. The wafer carrier of claim 1, having a circular shape.

12. The wafer carrier of claim 1, wherein the recess has a flat floor, whereby a correspondingly flat wafer can be reposed in the recess with a main bottom face of the wafer in contact over its facial area with the floor of the recess.

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13. The wafer carrier of claim 1, having a flat bottom face that is reposable in direct contact with a recess in a susceptor over the bottom facial area of the wafer carrier.

14. The wafer carrier of claim 1, formed of a semiconductor wafer material of construction.

5 15. The wafer carrier of claim 1, formed of a material selected from the group consisting of silicon carbide, silicon, quartz, graphite, boron nitride, aluminum oxide, aluminum nitride, silicon carbide on graphite, titanium carbide on graphite, glassy carbon, sapphire, indium phosphide, gallium antimonide, gallium arsenide and III-V nitrides.

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16. The wafer carrier of claim 1, wherein the wafer carrier is formed of a same material of construction as said wafer.

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17. The wafer carrier of claim 16, wherein said material of construction comprises a material selected from the group consisting of silicon carbide, silicon, quartz, graphite, boron nitride, aluminum oxide, aluminum nitride, titanium carbide, glassy carbon, sapphire, indium phosphide, gallium antimonide, gallium arsenide and III-V nitrides.

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18. The wafer carrier of claim 1, wherein the wafer carrier is formed of a different material of construction from that of said wafer.

19. The wafer carrier of claim 18, wherein the wafer carrier is formed of a material of construction that is etch-resistant in relation to an etch-susceptible material of construction of the wafer, with respect to a same etchant.

5 20. A process tool system, comprising:
a process tool comprising a susceptor or wafer holder having at least one recess therein of a first size and/or shape;
at least one wafer carrier of a size and shape to closely fit in a recess of said susceptor or wafer holder, said wafer carrier having a recess therein of a second
10 size and/or shape differing from said first size and/or shape; and
at least one wafer of a size and shape to closely fit in the recess of said wafer carrier.

15 21. The process tool system of claim 20, wherein the process tool comprises an epitaxial reactor.

22. The process tool system of claim 21, including a susceptor having one recess.

20 23. The process tool system of claim 21, including a susceptor having more than one recess.

24. The process tool system of claim 21, further comprising an automated wafer handling device, arranged for handling of said wafer carrier and a wafer in the recess thereof, as a unitary wafer carrier/wafer article.

25. The process tool system of claim 21, wherein said first size and/or shape differ(s) from said second size and/or shape, in respective shapes.

5 26. The process tool system of claim 21, wherein said first size and/or shape differ(s) from said second size and/or shape, in respective sizes.

27. The process tool system of claim 21, wherein each of the wafer carrier and said recess therein has a cylindrical shape.

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28. The process tool system of claim 27, wherein said wafer carrier has an outer diameter on the order of 150 mm, and the wafer and wafer recess have a diameter on the order of 100 mm.

15 29. The process tool system of claim 27, wherein said wafer carrier has an outer diameter on the order of 200 mm, and the wafer and wafer recess have a diameter on the order of 100 mm.

30. The process tool system of claim 27, wherein said wafer carrier has an outer
20 diameter on the order of 200 mm, and the wafer and wafer recess have a diameter on the order of 150 mm.

31. The process tool system of claim 27, wherein said wafer carrier has an outer diameter on the order of 150 mm, and the wafer and wafer recess have a diameter on the order of 125 mm.

5 32. The process tool system of claim 21, wherein the wafer carrier has a generally planar body.

33. The process tool system of claim 21, wherein the wafer carrier has a circular shape.

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34. The process tool system of claim 20, wherein the wafer carrier recess has a flat floor, and said wafer is correspondingly flat and reposed in the wafer carrier recess with a bottom face of the wafer in contact over its facial area with the floor of the wafer carrier recess.

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35. The process tool system of claim 21, wherein the wafer carrier has a flat bottom face that is reposed in direct contact with a susceptor recess over a bottom facial area of the wafer carrier.

20 36. The process tool system of claim 21, wherein the wafer carrier is formed of a semiconductor wafer material of construction.

37. The process tool system of claim 20, wherein the wafer carrier is formed of a material selected from the group consisting of silicon carbide, silicon, quartz, sapphire, indium phosphide, gallium antimonide, gallium arsenide and III-V nitrides.

5 38. The process tool system of claim 21, wherein the wafer carrier is formed of a same material of construction as said wafer.

39. The process tool system of claim 38, wherein said material of construction comprises a material selected from the group consisting of silicon carbide, silicon, quartz,
10 graphite, boron nitride, aluminum oxide, aluminum nitride, glassy carbon, sapphire, titanium carbide, indium phosphide, gallium antimonide, gallium arsenide and III-V nitrides.

40. The process tool system of claim 21, wherein the wafer carrier is formed of a
15 different material of construction from that of said wafer.

41. The process tool system of claim 40, wherein the wafer carrier is formed of a material of construction that is etch-resistant in relation to an etch-susceptible material of construction of the wafer, with respect to a same etchant.

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42. A wafer carrier according to claim 1, wherein said tool comprises a single wafer epitaxial reactor.

43. The process tool system of claim 21, wherein said epitaxial reactor comprises a single wafer epitaxial reactor.

44. The wafer carrier of claim 1, of a pedestaled form.

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45. The wafer carrier of claim 44, comprising a single cylindrical recess of a first diameter, and a columnar base with a second diameter that is smaller than said first diameter.

10 46. The process tool system of claim 21, comprising a susceptor, wherein said wafer carrier recess is of a larger diameter than said susceptor recess.

47. The wafer carrier of claim 1, comprising a cylindrical recess of a first diameter, and a columnar base with a second diameter that is smaller than said first diameter.

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48. The wafer carrier of claim 1, wherein said predetermined size is larger than said different size.

49. The wafer carrier of claim 1, wherein said predetermined size is smaller than said
20 different size.

50. The wafer carrier of claim 1, having an outer edge of a same thickness as a thickness of a wafer having a same diameter as the wafer carrier.

51. The process tool system of claim 20, including a susceptor having one recess.

52. The process tool system of claim 20, including a susceptor having more than one recess.

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53. The process tool system of claim 20, further comprising an automated wafer handling device, arranged for handling of said wafer carrier and a wafer in the recess thereof, as a unitary wafer carrier/wafer article.

10 54. The process tool system of claim 20, wherein said first size and/or shape differ(s) from said second size and/or shape, in respective shapes.

55. The process tool system of claim 20, wherein said first size and/or shape differ(s) from said second size and/or shape, in respective sizes.

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56. The process tool system of claim 20, wherein each of the wafer carrier and said recess therein has a cylindrical shape.

57. The process tool system of claim 20, wherein said wafer carrier has an outer
20 diameter on the order of 150 mm, and the wafer and wafer recess have a diameter on the order of 100 mm.

58. The process tool system of claim 20, wherein said wafer carrier has an outer diameter on the order of 200 mm, and the wafer and wafer recess have a diameter on the order of 100 mm.

5 59. The process tool system of claim 20, wherein said wafer carrier has an outer diameter on the order of 200 mm, and the wafer and wafer recess have a diameter on the order of 150 mm.

10 60. The process tool system of claim 20, wherein said wafer carrier has an outer diameter on the order of 150 mm, and the wafer and wafer recess have a diameter on the order of 125 mm.

15 61. The process tool system of claim 20, wherein the wafer carrier has a generally planar body.

62. The process tool system of claim 20, wherein the wafer carrier has a circular shape.

20 63. The process tool system of claim 20, wherein the wafer carrier has a flat bottom face that is reposed in direct contact with a susceptor recess over a bottom facial area of the wafer carrier.

64. The process tool system of claim 20, wherein the wafer carrier is formed of a semiconductor wafer material of construction.

65. The process tool system of claim 20, wherein the wafer carrier is formed of a same material of construction as said wafer.

66. The process tool system of claim 65, wherein said material of construction comprises a material selected from the group consisting of silicon carbide, silicon, quartz, graphite, boron nitride, aluminum oxide, aluminum nitride, glassy carbon, sapphire, titanium carbide, indium phosphide, gallium antimonide, gallium arsenide and III-V nitrides.

67. The process tool system of claim 20, wherein the wafer carrier is formed of a different material of construction from that of said wafer.

68. The process tool system of claim 67, wherein the wafer carrier is formed of a material of construction that is etch-resistant in relation to an etch-susceptible material of construction of the wafer, with respect to a same etchant.

69. A method of processing a wafer in a process tool including a susceptor or wafer holder having a recess therein of different size and/or shape than the wafer, said method comprising:

providing a wafer carrier having (i) a size and shape to closely fit in the recess of the susceptor or wafer holder, and (ii) a recess therein with a size and shape accommodating close-fit positioning of the wafer therein;

positioning the wafer in the wafer carrier recess to form a wafer carrier/wafer article;

5 positioning the wafer carrier/wafer article in the susceptor or wafer holder recess in the process tool; and

processing the wafer in the process tool to carry out at least one semiconductor manufacturing operation thereon.

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70. The method of claim 69, wherein said semiconductor manufacturing operation comprises deposition of an epitaxial film material.